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Review of Prince William Sound Management Area Dungeness Crab, Shrimp, and Miscellaneous Shellfish Fisheries

A Report to the Alaska Board of Fisheries

by

Robert Berceli

and

Charles E. Trowbridge

February 2006

Alaska Department of Fish and Game

Divisions of Sport Fish and Commercial Fisheries



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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative		fork length	FL
deciliter	dL	Code	AAC	mideye-to-fork	MEF
gram	g	all commonly accepted		mideye-to-tail-fork	METF
hectare	ha	abbreviations	e.g., Mr., Mrs., AM, PM, etc.	standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted			
liter	L	professional titles	e.g., Dr., Ph.D., R.N., etc.	Mathematics, statistics	
meter	m	at	@	<i>all standard mathematical</i>	
milliliter	mL	compass directions:		<i>signs, symbols and</i>	
millimeter	mm	east	E	<i>abbreviations</i>	
		north	N	alternate hypothesis	H _A
		south	S	base of natural logarithm	<i>e</i>
		west	W	catch per unit effort	CPUE
		copyright	©	coefficient of variation	CV
		corporate suffixes:		common test statistics	(F, t, χ^2 , etc.)
		Company	Co.	confidence interval	CI
		Corporation	Corp.	correlation coefficient	
		Incorporated	Inc.	(multiple)	R
		Limited	Ltd.	correlation coefficient	
		District of Columbia	D.C.	(simple)	r
		et alii (and others)	et al.	covariance	cov
		et cetera (and so forth)	etc.	degree (angular)	°
		exempli gratia		degrees of freedom	df
		(for example)	e.g.	expected value	<i>E</i>
		Federal Information		greater than	>
		Code	FIC	greater than or equal to	≥
		id est (that is)	i.e.	harvest per unit effort	HPUE
		latitude or longitude	lat. or long.	less than	<
		monetary symbols		less than or equal to	≤
		(U.S.)	\$, ¢	logarithm (natural)	ln
		months (tables and		logarithm (base 10)	log
		figures): first three		logarithm (specify base)	log ₂ , etc.
		letters	Jan, ..., Dec	minute (angular)	'
		registered trademark	®	not significant	NS
		trademark	™	null hypothesis	H ₀
		United States		percent	%
		(adjective)	U.S.	probability	P
		United States of		probability of a type I error	
		America (noun)	USA	(rejection of the null	
		U.S.C.	United States	hypothesis when true)	α
			Code	probability of a type II error	
		U.S. state	use two-letter	(acceptance of the null	
			abbreviations	hypothesis when false)	β
			(e.g., AK, WA)	second (angular)	"
				standard deviation	SD
				standard error	SE
				variance	
				population	Var
				sample	var
Weights and measures (English)					
cubic feet per second	ft ³ /s				
foot	ft				
gallon	gal				
inch	in				
mile	mi				
nautical mile	nmi				
ounce	oz				
pound	lb				
quart	qt				
yard	yd				
Time and temperature					
day	d				
degrees Celsius	°C				
degrees Fahrenheit	°F				
degrees kelvin	K				
hour	h				
minute	min				
second	s				
Physics and chemistry					
all atomic symbols					
alternating current	AC				
ampere	A				
calorie	cal				
direct current	DC				
hertz	Hz				
horsepower	hp				
hydrogen ion activity	pH				
(negative log of)					
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

SPECIAL PUBLICATION NO. 06-10

**REVIEW OF PRINCE WILLIAM SOUND MANAGEMENT AREA
DUNGENESS CRAB, SHRIMP, AND MISCELLANEOUS
SHELLFISH FISHERIES**

A REPORT TO THE ALASKA BOARD OF FISHERIES

by

Robert Berceli
Division of Commercial Fisheries, Cordova

and

Charles E. Trowbridge
Division of Commercial Fisheries, Homer

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1599

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Robert Berceli
Alaska Department of Fish and Game, Division of Commercial Fisheries,
PO Box 669, Cordova, AK 99574, USA

and

Charles E. Trowbridge
Alaska Department of Fish and Game, Division of Commercial Fisheries,
3298 Douglas Place, Homer, AK 99603, USA

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ABSTRACT

This report includes summaries of reported catch and effort information and management actions for Dungeness crab, shrimp, and miscellaneous shellfish fisheries managed by the Alaska Department of Fish and Game (ADF&G) in the Prince William Sound Management Area (Area E). Area E currently encompasses waters of Alaska from 144°00' W. longitude, near Cape Suckling, to the longitude of Cape Fairfield at 148°50.25' W. longitude. ADF&G is responsible for the management of commercial, subsistence, and personal use Dungeness crab *Cancer magister*, sidestripe shrimp *Pandalopsis dispar*, spot shrimp *Pandalus platyceros*, coonstripe shrimp *Pandalus hypsinotus*, weathervane scallops *Patinopecten caurinus*, razor clams *Siliqua patula*, and miscellaneous shellfish which includes squid, octopus *Octopus dofleini*, green urchin *Stronglyocentrotus droebachiensis*, and sea cucumber *Parastichopus californicus* fisheries.

Key words: assessment, management, commercial, Dungeness crab, *Cancer magister*, spot shrimp, *Pandalus platyceros*, coonstriped shrimp, *Pandalus hypsinotus*, weathervane scallop, *Patinopecten caurinus*, razor clam, *Siliqua patula*, squid, octopus, *Octopus dofleini*, sea urchin, *Stronglyocentrotus droebachiensis*, sea cucumber, *Parastichopus californicus*, Alaska Board of Fisheries, Prince William Sound, Area E.

INTRODUCTION

This report updates information on several commercially important shellfish species in the Prince William Sound (PWS) area through the 2005 calendar year (Berceli et al. 2003). Commercial fisheries include sidestripe shrimp *Pandalopsis dispar* and weathervane scallops *Patinopecten caurinus*. Subsistence fisheries for razor clams *Siliqua patula* also occur. Commercial fisheries for spot shrimp *Pandalus platyceros* and Dungeness crab *Cancer magister* are closed at this time due to depressed stock conditions. However, the harvest history, management and research programs, and stock status of these species are reviewed. Directed fishing for most other marine invertebrates, including squid, octopus, sea cucumbers, and sea urchins, may occur only under the conditions of a permit issued by the Alaska Department of Fish and Game (ADF&G). Although there are currently no directed fisheries for these species in PWS, bycatch harvests for octopus and squid, as well as historical efforts to target sea urchins and sea cucumbers, are discussed. Lacking basic stock abundance and status information, ADF&G is unlikely to issue permits for these species unless a harvestable surplus is clearly identified and the approach includes funding for stock assessment. Harvest data for some species within some years and areas, are confidential due the low level of participation. Table 1 lists emergency orders affecting area fisheries during 2003–2005.

The PWS Area currently encompasses waters of Alaska from 144°00' W. longitude, near Cape Suckling, to the longitude of Cape Fairfield at 148°50.25' W. longitude (Figure 1). The area is divided into the Inside and Outside Districts. The Inside District is waters enclosed by lines from Point Whited to Point Bentinck, from Cape Hinchinbrook to Zaikof Point, and from Cape Cleare to Cape Puget. The Outside District, comprised of the Gulf of Alaska waters 0–3 miles from shore, is divided into two sections, the Western and Eastern. The Western Section includes waters between Cape Fairfield and 147°00' W. longitude and the Eastern Section includes waters between 147°00' W. longitude and 144°00' W. longitude.

DUNGENESS CRAB

PROPOSAL 301

This proposal would repeal subsection (c) of the management plan that specifies the plan will sunset after July 31, 2006.

BACKGROUND

Major Dungeness crab harvests historically occurred within Orca Inlet, the Copper River Delta, and Controller Bay areas (Kimker 1985; Figures 2 and 3). Relatively minor harvests of Dungeness crab also occurred from Orca Bay and from the western portion of the Inside District (Figures 1 and 2).

Orca Inlet, immediately adjacent to Cordova, once provided a Dungeness crab fishery for small vessels in an area protected from adverse sea conditions. Harvests ranged from approximately 35,000 lb in 1976 to over 1.5 million lb in 1960, but this area has been closed since 1980 due to low crab abundance (Appendix A1).

The Copper River Dungeness crab fishery occurred along the eastern portion of the Copper River Delta and in the Controller Bay area. Harvests ranged from approximately 70,000 lb in 1991 to 1.5 million lb in 1981, with an average catch of approximately 590,000 lb and an effort of 12 vessels annually during 1983–1992, the most recent fishing years (Appendix A1). The Copper River fishery has been closed since 1992 due to low crab abundance.

Statewide Dungeness regulations provide for a male-only harvest with a minimum carapace width of 6½ inches. Gear requirements include a biodegradable escape mechanism and two 4¾ inch escape rings. Regulations specific to PWS include superexclusive area registration, a 250-pot limit for the Outside District and a 100-pot limit for the Inside District, and an April 1 to December 31 season. A split regulatory open season with dates of March 20 to May 20 and July 25 to December 31 was implemented in 1987 for the Copper River fishery. The May 21 to July 24 closure was designed to reduce handling mortality during the soft shell period following the male molt. Additionally, the Controller Bay area closes by regulation on October 15 in an effort to reduce gear loss and consequent mortality from storms in this area of shallow water.

Past management strategies failed to provide for a sustainable fishery and the crab population remains depressed despite long-term fishery closures. The likelihood of a fishery in the near term is low. In 2000, the board adopted a regulatory closure of all PWS Dungeness crab fisheries until stocks recover and a conservation-based management plan is approved. Although all commercial and non-commercial fisheries targeting Dungeness crab are currently closed, anecdotal information indicates continued bycatch of Dungeness crab by the Copper River salmon gillnet fleet. The population impacts of this bycatch are difficult to quantify, but may be significant given the status of the stock.

ADF&G has used a standardized Dungeness pot survey to collect data on size, sex, shell condition, and catch rates of Dungeness crab in the PWS management area. An annual survey in Orca Inlet from 1977 to 1994 was changed to a biennial survey in 1995 due to low crab abundance and budget constraints. From a standardized survey effort of 30 pots, the 2002 survey caught no Dungeness crab in 30 pot lifts. The survey was not conducted in 2004 but resumed in 2005 and produced 2 sublegal Dungeness crab in 25 pot lifts.

The scope of the survey in the Copper River Delta area has changed over time with respect to survey dates and locations fished. Beginning in the late 1970s, ADF&G initiated seasonal closures when soft-shell crab appeared in the fishery. An annual Dungeness pot survey was begun to assess the soft-shell percentage prior to reopening the fishery. After adoption of the split season in 1987, ADF&G conducted the survey prior to the July 25 opening date. If 10% or more of the crab were in a soft-shell condition, the fishery was delayed, and another survey conducted in August. The July survey was discontinued in 1998 due to the prevalence of soft-shell crab in most years and budget constraints, but the August survey is still conducted annually at standard index sites.

ADF&G surveys documented a precipitous decline of the legal male segment of the population and its continued depressed condition relative to historical population levels. Survey catches of legal male crab declined from 16.0 crab/pot in 1986 to a low of 0.1 crab/pot in 1997, before increasing to 1.7 crab/pot in 2002 (Table 2). From 1998 through 2003, survey catches averaged 0.9 legal male crab per pot. The survey was not conducted in 2004 but resumed in 2005 and yielded 2.3 legal male crab per pot. While the survey reflects a gradual improvement, these catch rates remain well below survey catches during the 1980's when the fishery was active.

2006 MANAGEMENT OUTLOOK

The decline of the Copper River Dungeness crab stock coincides with the collapse of other shellfish populations in the PWS area and northwest Gulf of Alaska waters (Bechtol 1997). Possible explanations for the stock decline and failure to recover include overfishing, sporadic recruitment, predation, and environmental changes that affect disease, growth, and larval survival. Dungeness crab in PWS occur at the northern extent of the geographic distribution for this species, a factor that may have implications for recruitment, growth, and survival. Because of the need to maximize crab reproductive opportunity at a time when ecological conditions have improved, continued fishery closures are justified because all crab are needed to sustain the limited existing productivity. ADF&G plans to continue monitoring PWS Dungeness crab stocks through pot surveys. When recovery of the population is evident, a management plan will be developed for consideration by the board and user groups.

POT SHRIMP

PROPOSALS 306, 308, 309, 310, 311, AND 312

Proposals 306 and 312 seek to reestablish the PWS commercial shrimp pot fishery.

Proposals 308–311 seek to limit entry in the PWS commercial shrimp pot fishery.

BACKGROUND

The Prince William Sound shrimp pot fishery primarily occurred within the Inside District. The principal harvest area encompassed the northern shore of PWS from Port Valdez to Whittier and all of western and southwestern PWS including Montague Strait. This area was historically designated the Traditional Harvest Area (THA) (Figure 4).

The shrimp pot fishery targeted spot shrimp and, to a limited extent, coonstripe shrimp *Pandalus hypsinotus* (Appendix A2). Commercial shrimp landings were first documented in 1960 when approximately 5,000 lb were harvested. From 1960 through 1977, catch varied from a report of no harvests in 1961 and 1966, to approximately 25,000 lb in 1974. The shrimp pot fishery

expanded rapidly during 1978 to 1982 as local markets were established and the major harvest areas located. During 1982 to 1984, the open season was reduced to April 1 through November 30 with a guideline harvest range of 75,000 to 145,000 lb. The split season was intended to reduce harvests during the egg bearing periods. Despite the shortened season, catch increased to approximately 214,000 lb in 1982 and effort increased to 79 vessels in 1984. Beginning in 1985, the board established a split season of March 15 through June 30 and August 15 through December 5, with a guideline harvest range (GHR) of 75,000–100,000 lb each season, and an experimental harvest area with no closed season. Due to a poor catch and late reporting, coupled with harvest from the experimental fishing area, harvests substantially exceeded the GHR over the next few years. Harvest peaked at approximately 290,600 lb in 1986 and effort increased to 86 vessels in 1987. Harvest declines beginning in 1988 indicated stock conservation problems. The *Exxon Valdez* Oil Spill (EVOS) complicated prosecution of the 1989 fishery in which 33 vessels harvested 29,315 lb. In 1991, a limited commercial fishery with a conservative guideline harvest range of 10,000 to 40,000 lb was closed after 46 days of fishing had yielded only 17,580 lb taken by 15 vessels in 45 landings. Fishery performance data from the 1991 fishery indicated that the stock was at a very low level. Although the commercial spot shrimp season was closed by emergency order beginning in 1992, noncommercial fisheries remained open. In 1994 the board lowered the PWS pot shrimp GHR to 0–100,000 lb.

Statewide shrimp regulations specify buoy marking, maximum tunnel size, and a biodegradable escape mechanism. Additional area regulations specific to shrimp fishing with pot gear include a limit of 150 pots per vessel and pots with a definable side must have at least two adjacent sides completely composed of rigid mesh that allows the unaided passage of a 7/8-in dowel. Round pots must have the rigid mesh covering a minimum of 50% of the vertical surface area of the pot. A commissioner's permit was required to fish in the eastern area to allow monitoring of effort and catch via mandatory logbooks and ADF&G contact.

Prior to 2000, there was no closed season and gear for sport and personal use shrimp fishing was limited to 5 pots per person and 10 pots per vessel. Subsistence fishing regulations specified limits of 10 pots per person and a limit of 20 pots per vessel. However, index surveys indicated a continuing decline in spot shrimp abundance through the 1990s. To conserve the reproductive potential of the existing population, the board closed the commercial fishery in 2000 until the population rebuilds and a new management plan is adopted. The board also made a customary and traditional use determination that 9,000–15,000 lb of useable shrimp are reasonably necessary for subsistence in the PWS area, and restructured the subsistence, personal use, and sport fisheries. These new regulations established a fishing season of April 15 to September 15, limits of 5 pots per person and 5 pots per vessel, and a harvest permit requirement. The closed season protected egg-bearing females and the permit provided ADF&G with participation and harvest data.

In 1989, as part of the EVOS damage assessment process, ADF&G initiated an annual survey using pot gear to assess spot shrimp in the THA (Trowbridge 1992, 1994). Six stations in the northern, western, and southwestern portions of PWS have been surveyed since 1989, with two additional stations added in southwestern PWS in 1991 (Figure 4). Data from the survey, specifically catch per unit of effort (CPUE) and sex ratios, were used in making management decisions regarding the 1991 fishery and in subsequent years when the fishery was closed by emergency order. ADF&G survey catches declined 44% from 1.29 lb per pot in 1989 to 0.37 lb

per pot in 1993. While survey catches increased to from 0.59 lb per pot in 1995, they again declined to low of 0.29 lb per pot in 1998 (Table 3).

Since 1998, results from ADF&G's standardized index survey for spot shrimp demonstrate an annual incremental increase in abundance to 1.46 lb/pot in 2004. The 2005 survey index of 1.39 lb per pot was approximately equal to the level observed in 1989 when the fishery had experienced some partial area closures. Survey data indicate the number of egg bearing females remains below levels observed in the early 1990s. However, the number of male shrimp in portions of PWS is at or above levels observed at the survey's inception.

An ADF&G study following the EVOS concluded that PWS spot shrimp declined as a result of overfishing (Trowbridge 1992). Successive depletion and insufficient resolution of harvest location masked localized CPUE declines until decreased stock abundance was widespread. An ADF&G tagging study during 1983–1986 indicated that spot shrimp lifespan could exceed 7 years (Kimker et al. 1996). Spot shrimp are also remarkably sedentary, making them particularly susceptible to serial depletion. The fishery is also size and female selective because spot shrimp are hermaphroditic, beginning life as males and becoming females as they attain a larger size. Similar to other shellfish populations along the margins of the Gulf of Alaska, environmental conditions were likely instrumental in the decline and slow recovery of the spot shrimp stock in PWS (Bechtol 1997).

2006 MANAGEMENT OUTLOOK

While ADF&G is encouraged by the recent survey results, index catch rates suggest the resource is only approaching the level observed in the early 1990s when the commercial fishery was curtailed. The shrimp population remains below the abundance that supported fisheries for all user groups in the 1980s, and ADF&G still considers the PWS spot shrimp resource to be in a rebuilding process. ADF&G is still discouraged by the extent of illegal gear being reported in the PWS pot shrimp fishery. Approximately 100 of 250 shrimp pots checked were seized due to violation of some aspect of the regulations (Alaska Bureau of Wildlife Enforcement, Cordova; personal communication). Unmarked buoys, illegal mesh size and lack of biological escape mechanism continue to be common violations.

SHRIMP TRAWL

PROPOSALS 307 AND 313

Proposal 307 would close waters of PWS located south of 60° 22.00' N. lat. and west of 148° 03.00' W. long. to commercial shrimp fishing with pot and trawl gear.

Proposal 313 would allow a shrimp trawl fisherman with PWS sablefish quota to fish with an excluder bar spacing of 4 inches during the concurrent sablefish and shrimp seasons and retain both species.

BACKGROUND

The PWS shrimp trawl fishery primarily occurs within the Inside District. Historical shrimp trawl landings date to the early 1970's but the fishery didn't develop until the late 1970s when several vessels harvested northern (pink) shrimp *Pandalus borealis* from Icy Bay and adjacent waters of southwest PWS. Harvest and effort in the fishery peaked in 1984 with approximately

1.3 million lb and 14 vessels before declining to 245,870 lb and 3 vessels in 1986 (Appendix A3). As the fishery for northern shrimp declined due to low stocks, reduced exvessel value, and limited processing capabilities, a fishery targeting sidestripe shrimp began to develop.

Commercial harvests of sidestripe shrimp were first documented in 1983 from Icy Bay and southwest waters, but subsequent effort focused on Port Wells and Wells Passage in the northwest area. Sidestripe shrimp harvests increased in 1985 as markets developed for a fleet of small vessels targeting previously unfished stocks. The fishery operated chiefly from the port of Whittier. Shrimp tails were sold fresh in PWS communities and Anchorage while markets for whole, fresh, and frozen sidestripe shrimp existed in both Anchorage and Japan (Trowbridge 1995). ADF&G has used logbooks, fish tickets, and catch reporting requirements to manage the fishery.

During the period 1987 to 1993, the sidestripe shrimp fishery harvest and effort increased from less than 100,000 lb landed by 2 vessels to 246,000 lb landed by 7 vessels. As the fishery continued to develop, uncertainty increased about sidestripe shrimp stock status in Wells Section. Beginning in 1990, ADF&G used onboard observer data to calculate an area-swept estimate of shrimp abundance in the Port Wells and Wells Passage area. The GHL was determined inseason by applying a 20% harvest rate to estimated shrimp biomass. Although this management strategy initially seemed conservative, harvest levels declined from 80,000 lb in 1991 to 19,000 lb in 1999. From 1999 the GHL gradually increased to 34,400 lb in 2001, but declined to 23,500 lb in 2002 before again increasing to 36,700 lb in 2004.

The GHL for the Perry Passage area of the Northwest Section was established at 16,000 lb in 1995 based on an area-swept biomass estimate and a 20% harvest rate. Effort has historically been low in this area. The GHL was increased to 18,500 lb in 1996 based on increased fishery CPUE. Although the GHL remained at 18,500 into the 1998 season, the fishery was closed before the GHL was attained, due to declines in CPUE. Based on the 1998 fishery performance the 1999 GHL was reduced to 14,000 lb and has remained at that level. From 1999 to 2004 the GHL was attained in late May to late June.

The trawl fishery in the Central and Southwest Sections of PWS has been managed using historical catches and CPUE. During 1992 and 1993, effort in these areas increased sharply and included two larger catcher-processors. Catch and CPUE declined in these areas resulting in reduced harvest levels. Since 1995, the GHL for the central and southwest areas has been 33,000 lb based on the 1994 harvest from these areas. The GHL was attained in 1997, but not in 1998 or 1999 due primarily to low effort. From 2000 to 2004 the GHL was attained in mid July or early August.

Regulations for shrimp trawling in northwestern PWS adopted in 1986 included seasons, a commissioner's permit requirement, cod end specifications including 1½ inch mesh hung square to the mouth of the net, and a 10% limit on retention of northern shrimp. Regulations for the sidestripe shrimp fishery were largely restructured in 1994 when the board set open season dates of April 15–August 15 and October 1–December 31, amended the cod end mesh requirement and created the Northwest Shrimp Trawl Fishing District (NSTFD). The NSTFD was defined as waters north of 60°27.00' N. lat. and west of 147°20.00' W. long. and integrated important harvest areas as Port Wells, Wells Passage, and Perry Passage. The new season dates were based on biological data indicating that egg release was not complete until April 15 and industry reports that soft-shell shrimp were present until October 1.

In 2000, the board adopted a regulation requiring that shrimp trawls be equipped with a finfish excluder device. In 2003, the Board adopted regulations restructuring shrimp trawl management areas. The NSTFD was renamed Northwest Section and expanded south to 60°30.00'. Other sections created by this action included the Wells, Southwest, and Central Sections (Figure 5).

Regulations current to the PWS shrimp trawl fishery include a commissioner's permit that restricts the retention of northern shrimp or other pandalid species to no more than 20% by weight of the shrimp in possession. It also requires weekly catch reporting and that completed logbook sheets be returned with fish tickets within 7 days of landing.

Other regulatory measures for the shrimp trawl fishery include:

1. Open season dates of April 15–August 15 and October 1–December 31.
2. Cod end mesh composed entirely of 1 $\frac{7}{8}$ inch stretched mesh hung horizontal and perpendicular to the mouth of the trawl.
3. A year around closure in eastern Prince William Sound to minimize indirect fishing mortality on depressed stocks of king and Tanner crabs in these key production areas (Figure 5).
4. A shrimp trawl must be equipped with a finfish excluder device consisting of a rigid grate with parallel bars spaced not more than 2 $\frac{1}{2}$ -inch apart. Regulations specify how the excluder must be secured within the trawl and define an escapement outlet.

The regulatory spacing of 2 $\frac{1}{2}$ inches for excluder bars was adopted as a compromise between ADF&G and industry in an effort to reduce discard mortalities of finfish and shrimp. With the exception of the PWS sablefish fishery, bottom trawls are not legal gear for targeting groundfish in PWS.

In addition to catch performance data collected by ADF&G observers in the Port Wells and Wells Passage area, the sidestripe shrimp harvest is sampled for sex and size composition as indicators of change in stock status (Charnov 1981). Sex composition is important because sidestripe shrimp are protandric hermaphrodites that first recruit to the fishery as males and later transition to females. More intensive fishing pressure typically has the greatest impact on the larger, female, segment of the population. Sidestripe shrimp samples from the PWS fishery have indicated a trend of increasing female proportions over the last decade, from 15% to 44% (Figure 6). The extent of gear selectivity with respect to cod end mesh size and excluder requirements remains unknown. However, the predominant carapace length mode of male, transitional, and female sidestripe shrimp has remained fairly consistent and has only varied by a few millimeters between years (Figure 7).

2005 SEASON SUMMARY

The PWS sidestripe shrimp fishery opened by regulation on April 15, 2005. The preliminary GHL for the Wells Section was 36,700 lb based on the results of the 2004 assessment. Preliminary GHLs for the Northwest Section and the combined Central and Southwest Sections were 14,000 lb and 33,000 lb, respectively. The GHL in the Port Wells and Perry Passage area was subsequently adjusted inseason to 32,000 lb based on the inseason area-swept biomass estimates and a 20% harvest rate methodology.

The Wells Section closed by emergency order on June 2 with a total harvest of 35,031 lb from 19 landings by 3 vessels. The Northwest Section including Perry Passage closed on June 30 due to the projected attainment of the GHL (Table 1). Total harvest remains confidential due to the

limited number of participants. The Central and Southwest Sections closed August 11 and this harvest total is also confidential. The PWS season's harvest total from all management sections was 84,571 lb, from 47 landings by 3 vessels. This total includes 23,028 lb of deadloss. Deadloss is comprised of unmarketable or small shrimp and typically accounts for 5% to 45% of the shrimp catch depending upon the vessel, fishing area, and markets.

2006 MANAGEMENT OUTLOOK

ADF&G will continue to manage the sidestripe trawl fishery in the Wells Section using an area-swept population estimate generated from commercial trawl vessel data. The 2006 GHF will be 33,000 lb for the combined Central and Southwest Sections and 14,000 lb for the Northwest Section. Effort in the fishery is expected to remain stable due to the relatively low GHF. ADF&G will continue to monitor logbook and observer data for significant changes in CPUE.

RAZOR CLAMS

PROPOSALS

There are no proposals that directly address PWS razor clams.

BACKGROUND

The community of Cordova once regarded itself as the “razor clam capital of the world.” Annual harvests from the early-1900s through the mid-1950s achieved a maximum of 3.6 million lb in 1917 and frequently exceeded 1.0 million lb. Most of the harvest was canned for human consumption. Although historical fishery data are imprecise, it appears the majority of razor clam harvests occurred in Orca Inlet and the western Copper River Delta (Figure 3). The eastern Copper River Delta, which includes Kanak Island, was not a substantial contributor to early harvests.

From the late 1950s through the early 1980s, Alaska clam markets had declined due to market concerns for paralytic shellfish poisoning (PSP) and the inability to certify product as being free of PSP (Nickerson 1975). During this period, markets shifted to use of razor clams as Dungeness crab bait. The decline in razor clam harvest in Orca Bay and the western Copper River Delta was also attributed to a variety of factors including a market shift from the West coast to the East coast clam fishery, substrate change due to a siltation event from the Copper River in 1958, and habitat loss as result of the 1964 Good Friday Earthquake (Nickerson 1975). The 1958 siltation event is thought to have severely affected juvenile survival, while the 1964 earthquake caused significant uplift in prime razor clam habitat in Orca Inlet. These aspects contributed to the low harvests in the 1970s and early 1980s, resulting in a shift in clam digging effort to the east side of the Copper River Delta and Controller Bay area.

Demand for PWS razor clams increased again in 1983 when clam harvests for human consumption declined in Washington State (Appendix A4). The majority of the PWS clam harvest subsequently occurred at Kanak Island with lesser harvests coming from Softuk and Katalla beaches (Figure 3). Annual harvests during the 1980s attained a maximum of approximately 168,000 lb in 1984 before declining to less than 7,000 lb in 1988, with an average harvest and effort of 48,000 lb by 16 diggers during 1979–1988. No commercial harvests have occurred since 1988, except in 1994; 1994 data remain confidential because only 2 diggers participated.

A guideline harvest range of 100,000 to 150,000 lb is in effect for the combined commercial and sport/subsistence harvests from Kanak Island. By regulation, clams harvested from Kanak Island must be used for human consumption as food. There is a 4½ inch (114 mm) minimum legal size for all commercially harvested razor clams in the Copper River Delta. Commercial harvest beaches need annual certification by the Alaska Department of Environmental Conservation (ADEC) before bivalves can be sold for human consumption. Currently there are no areas within PWS that are certified for commercial clam harvest by ADEC. No harvest of the razor clam resource will be permitted until regulatory requirements of both ADEC and ADF&G are met. ADF&G monitored commercial razor clam harvests via fish ticket information. If the commercial clam fishery redevelops, ADF&G will monitor the stock via CPUE data.

A harvest permit must be obtained from ADF&G prior to the noncommercial harvesting (subsistence, sport, and personal use) of razor clams from the Copper River Delta. Regulations further specify a minimum legal size of 4½ inch (114 mm) for retained razor clams. Reported noncommercial harvests ranged from 27 lb by 4 diggers in 2000 to 6,225 lb in 1987 (Appendix A4).

2005 SEASON SUMMARY

ADF&G staff in Cordova issued 43 non commercial razor clam harvest permits. Seventeen successful diggers harvested 130 lb of razor clams. Twenty individuals receiving a permit did not dig, 5 individuals were unsuccessful and 1 permit remains outstanding. Harvests occurred on Katalla, Kanak, and Softuk beaches.

2006 MANAGEMENT OUTLOOK

Although ADF&G does not directly assess abundance of razor clams, reports from non-commercial diggers indicate that razor clam stocks in the eastern Copper River delta, Katalla, and Controller Bay areas remain in a depressed condition. This information is supported by the lack of interest from commercial diggers and the low number of subsistence permits issued in recent years.

WEATHERVANE SCALLOPS

PROPOSALS

Proposal 303 would simplify regulatory language by eliminating a redundant description of closed waters.

BACKGROUND

The commercial fishery for weathervane scallops in the PWS registration area began in 1992 in the Kayak Island area (Figures 2 and 8; Appendix A5). The fishery developed during a phase of industry expansion and transition from short trips with iced product to extended trips with product frozen onboard (Barnhart 2000; Shirley and Kruse 1995). Harvests occur in a small portion of the management area and typically more than 3 miles from shore, placing most fishing effort in waters of federal jurisdiction. The state manages this fishery via authority deferred to the state through a federal fishery management plan (Kruse 1994; NPFMC 1997).

The history of the PWS fishery reflects a continuous progression of regulatory changes, management measures and fishing practices. The most notable changes and results are described on a seasonal basis. Although vessels were initially given substantial liberty to explore potential

fishing areas, waters inside of PWS and adjacent waters of the Gulf of Alaska were closed to scallop dredging due to concerns for the bycatch of depressed Tanner and Dungeness crabs (Figure 8).

In 1992, fishing began in late February and the GHLL of 64,000 lb of scallop meats was calculated inseason using area-swept methods and a 10% harvest rate for the area east of 147°00' W long. (Figure 8). The fishery closed in April with a harvest total of approximately 209,000 lb of meats by 4 vessels (Appendix A5). The discrepancy between the 1992 GHLL and actual harvest was attributed to a lack of timely and accurate catch reporting, and insufficient data about the scallop biomass.

ADF&G management measures for the PWS fishery evolved significantly in 1993 when an interim fisheries management plan was implemented under regulation 5 AAC 39.210. Management Plan for High Impact and Emerging Fisheries. This interim plan included:

1. Area registration.
2. Gear restrictions, including 4-inch ring size and a maximum of two 15-foot dredges.
3. Guideline harvest level of 50,000 lb of shucked meat for the eastern area.
4. Bycatch caps of 500 and 130 Tanner crabs east and west of 147°00' W. long.
5. Season dates set by emergency order.
6. Industry funded observer program.
7. Crew size limit of 12.

In addition to the eastern area GHLL, the area west of 147°00' W. long. was given an initial GHLL of 5,000 lb to provide opportunity for exploratory fishing. The 500 Tanner crab bycatch cap was established as 0.5% of the Kayak Island Tanner crab harvest during the 1980–1983 crab seasons. Beginning in 1993, registration permits required an onboard observer and twice-daily radio reporting of fishing location effort, scallop catch, and bycatch.

The 1993 fishery opened July 15 with a 50,000 lb GHLL and closed July 18 with 7 vessels landing 63,068 lb of meats. The commercial scallop season did not open in 1994 due to a change in the season opening date from July to January. A Statewide Scallop Management Plan adopted by the board in 1994 set a January 10 season opening with closure by emergency order. Additionally, closure areas, intended to protect depressed Tanner crab and Dungeness crab stocks, were established in eastern PWS and along the Copper River Delta (Figure 8).

The 1995 weathervane scallop fishery opened January 10 and closed January 26 when the 50,000 lb GHLL was attained. Subsequent to the 1995 closure, an unlicensed vessel fished the Kayak scallop bed but remained outside territorial waters. This action identified a loophole in the Magnuson Fishery Conservation and Management Act (MFCMA) in which a vessel not licensed or registered by the State of Alaska could not be restricted from fishing scallops managed by the state in federal waters. Federal fisheries managers subsequently closed all scallop fisheries in federal waters off Alaska, but not before an estimated additional 60,000 lb of meats had been harvested near Kayak Island. Commercial scallop fishing in federal waters remained closed through 1996 while federal fisheries regulations were restructured.

In August of 1995 ADF&G initiated a fishery-independent scallop survey in waters east of Kayak Island to assess stock condition and effects of the postseason harvest. ADF&G returned in 1996 to conduct a systematic area-swept assessment using an 8-ft New Bedford style dredge

initially contributed by the industry. The dredge is equipped with a liner to maximize retention of scallop samples that are sampled for age and size composition, and sexual maturity. Survey results indicated recruitment to the Kayak Island bed was very low with only 11% of sampled scallops younger than age 7 and therefore a conservative GHL of 17,200 lb of scallop meats was warranted for the 1997 season (Bechtol and Bue 1998). The 1997 fishery opened on January 10 and closed on January 19, the harvest remains confidential due to limited participation.

In 1998 ADF&G's scallop survey was expanded to include waters located east and west of Kayak Island. Scallops beds were determined to occupy fairly discrete and limited areas with the highest concentrations occurring in federal waters. Results of the assessment survey indicated age-9 and age-10 year classes primarily composed the population. Variable recruitment was one determinant in applying the conservative exploitation rates of 4% and 8% to biomass estimates for areas east and west of the longitude of Cape Saint Elias. Using this exploitation rate, calculated GHLS for these two areas were 6,000 and 14,000 lb of scallop meats. This survey established the precedent of conducting a biennial survey served to establish the GHL's for two consecutive fishing seasons and separate GHLS for waters east and west of Cape Saint Elias (Appendix A5; Figure 8). A regulatory change moved the opening date of the scallop season from January 10 to July 1. Waters east of the longitude of Cape Saint Elias closed on July 2 while waters west of the longitude of Cape Saint Elias closed on July 4. Area specific harvests remain confidential due to limited participation, however the season's harvest total was 19,650 lb.

A federal license limitation program (LLP) for scallop fishing in federal waters was adopted in February 1999 resulting in a total of 9 vessels being eligible to fish scallops in Alaskan waters. Although all 9 vessels qualify to fish in the Cook Inlet Area, it is unlikely that effort will increase due to the 6-foot dredge restriction. In 1997, the Alaska Legislature established a similar scallop vessel moratorium; 10 vessels currently qualify. In May 2002, the state moratorium was extended to June 30, 2004. Prior to expiration of the moratorium, the Commercial Fisheries Entry Commission adopted a vessel permit program. Applicable only to state waters, the program established two vessel size classes, vessels greater or less than 80 feet in overall length. Eight permits have been issued.

The 1999 weathervane scallop fishery opened as described above. The eastern area closed July 3 and the western area closed July 4. Two vessels participated in the fishery and harvest data by area remain confidential, however the season's harvest totaled 20,275 lb. This season was notable for again being one of the shortest on record. As east and west scallop beds are in close proximity and have produced some of the highest catch rates observed in Alaska, mandatory observer coverage in this fishery is necessary to verify CPUE and scallop harvest by area.

In 2000, the BOF adopted regulation restricted the scallop fishery to the Eastern Section of the Outside District (Figure 1). This measure provided the opportunity for some exploration while protecting areas ADF&G did not assess.

Based on improved results of the 2000 assessment survey, GHLS were increased to 9,000 and 21,000 lb of scallop meats for areas east and west of Cape Saint Elias. The eastern harvest area closed July 31 with a harvest total of 8,998 lb. The western area closed August 2 with a 21,268 lb harvest by 3 vessels. Tanner crab bycatch was estimated to be 365 crab from the eastern area and 182 crab from the western area, or 547 total crab. Approximately half of the estimated Tanner crab bycatch in the eastern area occurred in a single tow where sample data

expanded to 48% of total fishery bycatch. Tanner crab samples were juveniles, ranging from 13 mm to 29 mm carapace width.

Prior to the 2001 regulatory season, a vessel cooperative formed among some, but not all Alaska weathervane scallop fishery permit holders. The effect in the Kayak fishery has been to considerably reduce the race for fish.

Beginning in 2001, ADF&G set Tanner crab bycatch caps at 0.5% of the Tanner crab population estimate from the 2000 scallop assessment survey. This resulted in bycatch limits of 2,700 and 8,700 for the east and west harvest areas. The 2001 season opened July 1 with GHLS of 9,000 and 21,000 lb of scallop meats and closed February 8 in the eastern area and February 11 in the western area; harvest data are confidential. Estimated fishery bycatch was 43 Tanner crab.

The 2002 assessment survey yielded poor results. Available age composition data indicated poor recruitment for this population. A decline in stock biomass would be expected given the relatively poor recruitment observed in recent years. However, it is likely that population biomass estimates were artificially low due to survey gear difficulties. As a precaution, ADF&G applied the GHL from the 1998 assessment levels to the 2002–2003 and 2003–2004 season scallop seasons.

The 2004 assessment survey yielded substantially improved results. Guideline harvest levels of 26,000 lb and 24,000 lb for waters east and west of Cape Saint Elias were established by applying harvest rates of 5.2% and 5.3% to the respective population estimates. Justification for the increased GHLS was justified by evidence of recruitment, relatively low harvest rates and comparison of dredge and video data (B. Bechtol, Commercial Fisheries Biologist, ADF&G, Homer; per personal communication).

2005 SEASON SUMMARY

The 2005-2006 Kayak Island scallop fishery opened at 12:00 noon July 1, 2005 with GHLS of 26,000 and 24,000 lb of scallop meats for harvest areas east and west of Cape Saint Elias. Waters west of Cape Saint Elias closed to commercial scallop fishing on August 13 with a harvest total of 23,875 lb. Waters east of Cape Saint Elias closed to commercial scallop fishing on August 22 with a harvest total of 25,458 lb. Tanner crab bycatch estimates were 173 and 234 for the east and west areas.

2006 MANAGEMENT OUTLOOK

The Kayak Island commercial scallop fishery will open July 1. ADF&G plans to conduct another assessment survey prior to the start of 2006 season. The current GHL is at the limit of the guideline harvest range established in regulation. Effort in the PWS fishery is expected to remain low due to the relatively small GHL and the cooperative harvest approach currently in place among eligible permit holders.

MISCELLANEOUS SHELLFISH

PROPOSALS

There are no proposals that directly address miscellaneous shellfish.

BACKGROUND

There are no directed fisheries for miscellaneous shellfish in PWS, however squid and octopus are taken as bycatch in other directed fisheries. Squid are encountered in ADF&G bottom trawl surveys (Bechtol 1999) and taken as bycatch during the commercial pollock trawl fishery and to some extent in the shrimp trawl fishery (Berceli et al. 2002). Since 1989 the harvest of squid has ranged from 0 lb in some years to 180,250 lb by 3 vessels over 22 landings in 2002 (Table 4). All harvest in 2002 occurred as bycatch in the pelagic trawl fishery for pollock that primarily occurs in Port Bainbridge and from Hinchinbrook Entrance to the mouth of Orca Bay (Figure 2). While the 2002 squid bycatch level was a dramatic increase over previous years, it was unclear whether the increase resulted from fishing practices or changes in the relative abundance of squid and pollock (Berceli et al. 2002). Additional bycatch restrictions were set for the pollock fishery in 2003 to encourage more efficient fishing practices.

Octopus are primarily harvested incidentally to the Pacific cod pot fishery. Octopus harvests first exceeded 1,000 lb in 1992, and attained a record harvest of 5,798 lb by 7 vessels in 1994 (Table 4). Octopus harvests from 1992 to 1998 averaged 3,400 lb, with no reported harvests from 1999–2001. Recent harvests are confidential due to the limited number of participants.

ADF&G has received several inquiries regarding the abundance of sea cucumbers and urchins. There are no reported landings of sea cucumbers or urchins from PWS, nor does ADF&G assess these species. The most recent commercial effort for sea cucumbers occurred in 1992 when 5 permits were issued but no catch reported. This is consistent with anecdotal reports on abundance from both ADF&G and sport divers. No permits have been issued for sea urchin harvest and anecdotal information indicates few urchins of a marketable size occur in PWS.

2005 SEASON SUMMARY

The incidental harvest of squid in the pollock trawl fishery totaled 6,155 lb. Octopus harvests remain at a low level but remain confidential due to the limited number of participants.

2006 MANAGEMENT OUTLOOK

ADF&G will continue to monitor squid bycatch in the pollock fishery to see that the harvest cap is not exceeded. Squid bycatch has not been utilized for commercial purposes but has become very popular with cannery workers for personal consumption. One Kodiak processor indicated they will try to retain squid bycatch for use as bait in longline fisheries.

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TABLES AND FIGURES

Table 1.—Shellfish emergency orders issued for the Prince William Sound Management Area E, 2003–2005.

Fishery	Emergency Order	Effective Date	Explanation
2003 Calendar Year			
Scallops	2-S-E-01-03	02/14/03	Commercial – Closed the season east of 147°00'W. long. to the longitude of Cape St. Elias.
Shrimp Trawl	2-S-E-02-03	5/7/03	Commercial – Closed the season within the Wells Section, Wells Passage and Port Wells area.
	2-S-E-03-03	5/23/03	Commercial – Closed the season within the Northwest Section, Perry Passage area.
	2-S-E-04-03	7/15/03	Commercial – Closed the season in the PWS management area for the remainder of the year.
2004 Calendar Year			
Scallops	2-S-E-01-04	1/23/04	Commercial – Closed the season east of 147°00'W. long. to the longitude of Cape St. Elias.
	2-S-E-02-04	1/24/04	Commercial – Closed the season east of the longitude of Cape St. Elias to 144°00'W.
	2-S-E-06-04	8/22/04	Closed the season east of the longitude of Cape St. Elias to 144°00'W.
Shrimp Trawl	2-S-E-03-04	5/25/04	Commercial – Closed the season within the Wells Section, Wells Passage and Port Wells area.
	2-S-E-04-04	6/24/04	Commercial – Closed the season within the Northwest Section, Perry Passage area
	2-S-E-05-04	8/5/04	Commercial – Closed the season in the PWS management area for the remainder of the year.
2005 Calendar Year			
Shrimp Trawl	2-S-E-01-05	6/2/05	Commercial – Closed the season within the Wells Section, Wells Passage and Port Wells area.
	2-S-E-02-05	6/30/05	Commercial – Closes the season within the Northwest Section, Perry Passage area.
	2-S-E-03-05	8/11/05	Commercial – Closes the season in the PWS area for the remainder of the year.
Scallops	2-S-E-04-05	8/13/05	Commercial – Closed the season east of the longitude of Cape St. Elias to 144°00'W.
	2-S-E-05-05	8/22/05	Closed the season east of 147°00'W. long. to the longitude of Cape St. Elias

Table 2.—Copper River Dungeness crab survey results, 1986–2005.

Year	Number of Pots	Male Crab Per Pot						Female Crab Per Pot
		Legal Crab	New shell Recruits	% New shell Recruits	Sublegal Crab	New shell Sublegal	% New shell Sublegal	
1986	65	16.0	12.1	76	10.8	3.8	35	3.1
1987	80	9.9	4.3	43	13.1	5.9	45	10.5
1988	80	8.0	4.8	60	11.8	4.1	35	9.2
1989				No Survey				
1990	80	8.3	3.0	36	8.6	1.9	22	8.0
1991	80	3.5	2.2	63	12.6	3.2	25	6.8
1992	80	1.1	0.3	27	10.0	3.4	34	2.0
1993	37	3.5	1.6	46	15.8	4.5	28	3.7
1994	78	1.4	0.3	21	9.2	3.1	34	1.4
1995	80	1.5	0.3	20	9.9	3.0	20	0.7
1996	80	1.1	0.3	24	3.5	1.3	37	0.1
1997	45	0.1	0	0	3.3	1.0	29	0.4
1998	65	0.3	0.1	31	7.4	3.8	52	0.3
1999	80	0.7	0.5	64	9.7	2.9	30	0.6
2000	80	0.7	0.5	34	5.6	3.2	46	0.4
2001	80	0.7	0.2	40	3.9	1.8	70	0.2
2002	80	1.7	0.6	34	10.8	5.0	47	0.6
2003	80	1.5	0.2	14	9.3	3.5	33	0.2
2004				No Survey				
2005	80	2.3	0.3	14	7.5	2.8	29	0.8

Table 3.—Prince William Sound spot shrimp survey results, 1989–2005.

Year	Number of Pots	Catch Weight (lb)	Average lb/Pot	Number of Shrimp	Average Shrimp/Pot	Females					
						Males		Total		Egg-Bearing	
						Number	Percent	Number	Percent	Number	Percent
1989	132	170	1.29	5,192	39.0	4,958	96.0	234	4.0	213	4.1
1990	132	177	1.34	4,283	22.0	3,910	91.0	373	9.0	343	8.0
1991	205	261	1.27	5,989	29.2	5,559	92.8	430	7.2	325	5.4
1992	371	273	0.73	5,195	14.0	4,565	87.9	630	12.1	610	11.7
1993	336	124	0.37	2,507	7.5	2,025	80.8	482	19.2	471	18.8
1994	351	133	0.38	3,815	10.9	3,651	95.7	164	4.3	159	4.2
1995	350	206	0.59	5,053	14.4	4,834	95.7	219	4.3	196	3.9
1996	351	182	0.52	4,617	13.2	NA	NA	237	5.1	NA	NA
1997	350	142	0.41	3,828	10.9	3,602	94.1	226	5.9	215	5.6
1998	264	77	0.29	2,252	8.5	2,131	94.6	121	5.4	121	5.4
1999 ^a	349	165	0.47	4,391	12.6	4,144	94.4	248	5.6	NA	NA
2000	351	246	0.70	6,545	18.7	6,224	95.1	318	4.8	309	4.7
2001	351	332	0.95	7,034	20.0	6,521	92.7	513	7.3	513	7.3
2002 ^b	306	377	1.23	8,798	28.8	7,998	90.9	800	9.1	NA	NA
2003	352	399	1.13	9,341	26.5	8,586	91.9	755	8.1	753	8.1
2004	352	516	1.46	12,595	35.8	12,595	91.5	1,070	8.5	1,041	8.3
2005	349	486	1.39	14,453	41.4	13,728	94.9	725	5.1	688	4.8

Note: NA = Data not available.

^a Sex data interpolated for 452 lost data points.

^b Sex data interpolated for 192 lost data points.

Table 4.—Reported landings and harvests of octopus and squid from Prince William Sound, 1989–2005.

Year	Octopus		Squid	
	Landings	Round Weight (lb)	Landings	Round Weight (lb)
1989	0	0	3	1,467
1990	0	0	9	2,166
1991	0	0	0	0
1992	10	1,230	7	399
1993	45	5,625	3	317
1994	34	5,798	0	0
1995	22	3,779	4	289
1996	4	994	10	168
1997	11	3,547	32	18,316
1998	5	2,928	27	21,461
1999	0	0	35	6,104
2000	0	0	17	5,951
2001	0	0	17	31,101
2002	^a	^a	22	180,250
2003	^a	^a	16	20,547
2004	^a	^a	9	11,175
2005	^a	^a	4	6,155
Average	19	1,839	13	17,992

^a Confidential data.

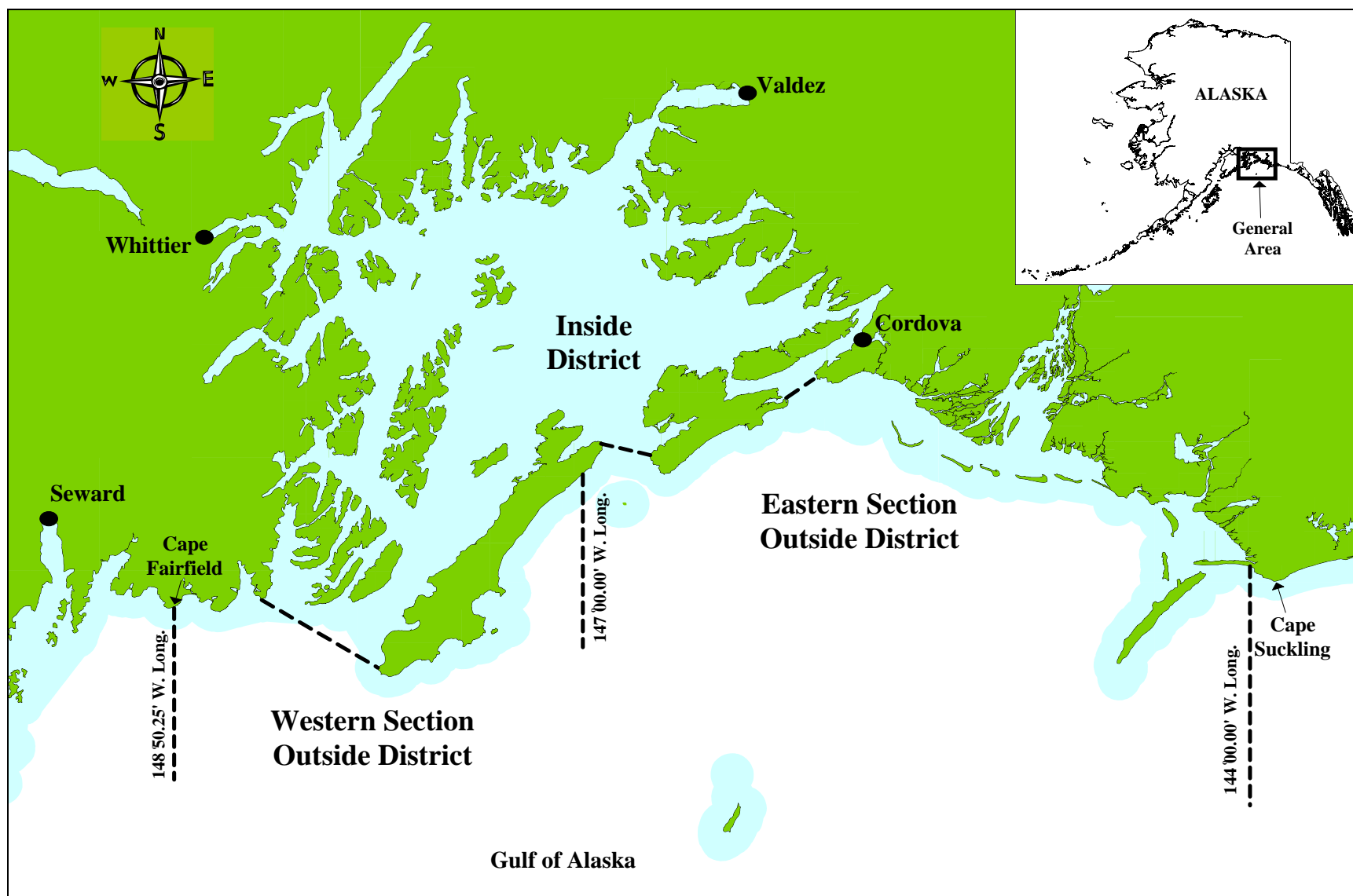


Figure 1.—Shellfish management districts and sections within Prince William Sound, Registration Area E.

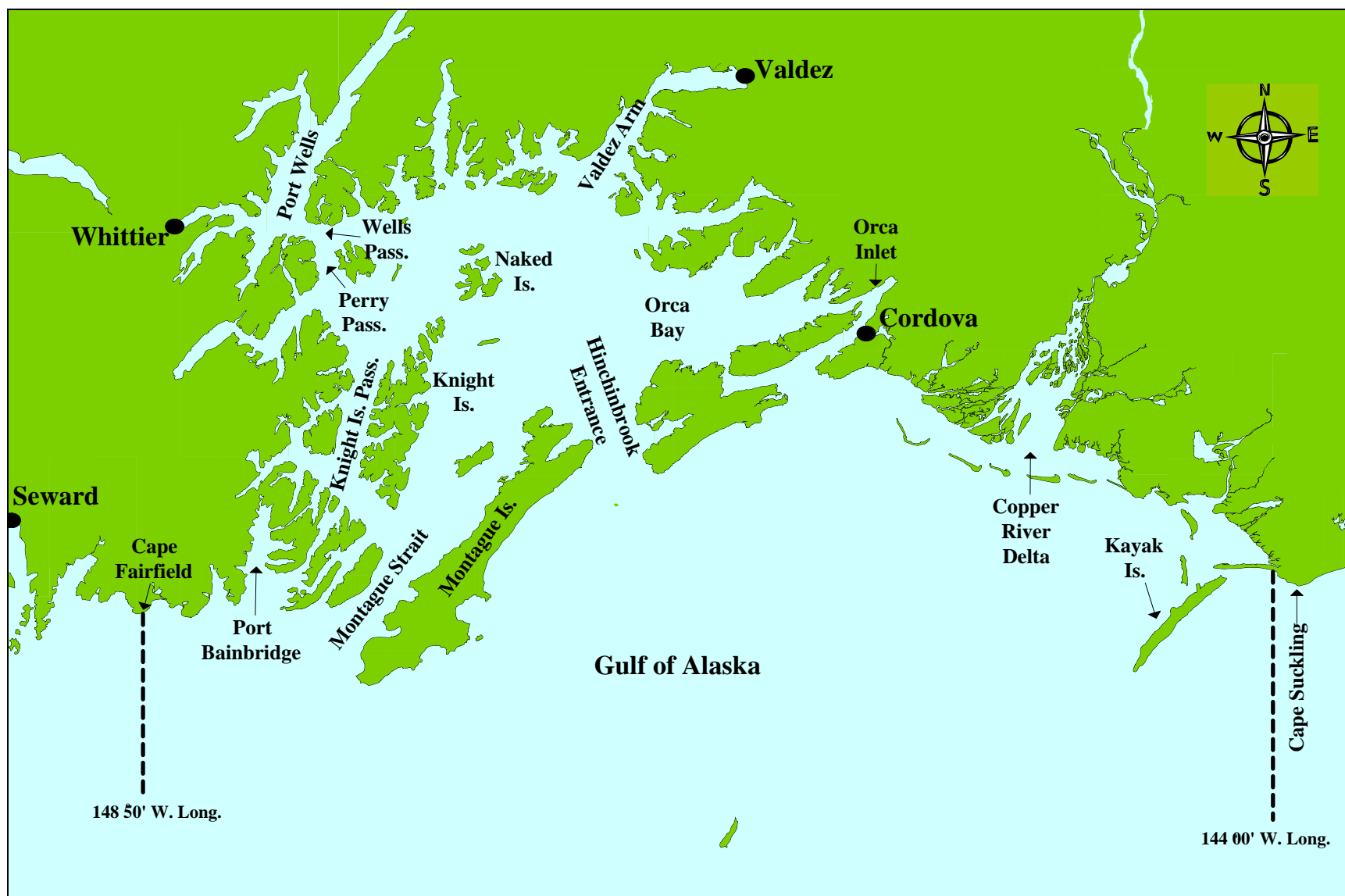


Figure 2.—Areas of note within the Prince William Sound Management Area.

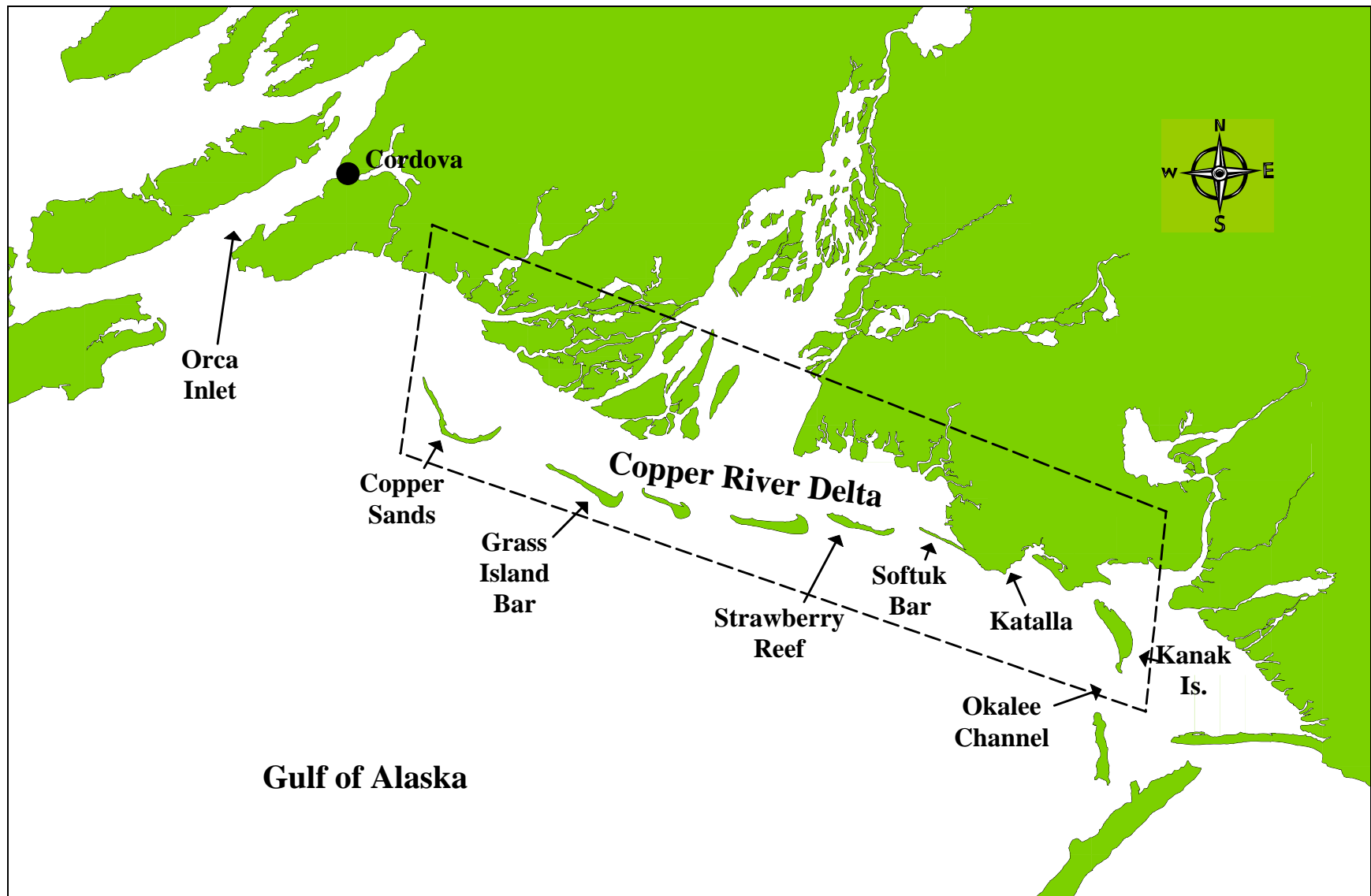


Figure 3.—Traditional harvest locations for Dungeness crab and razor clams in the Prince William Sound Management Area.

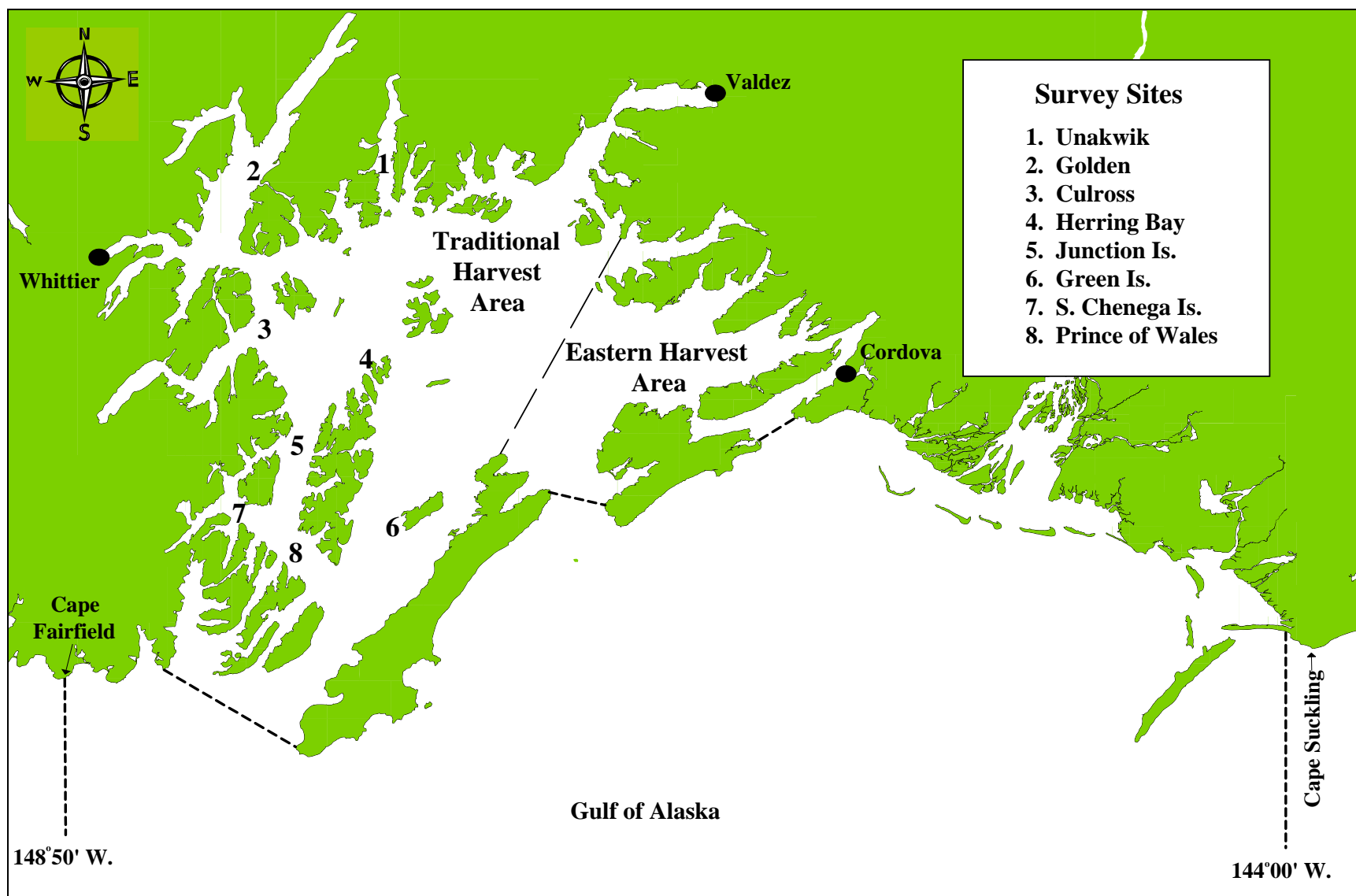


Figure 4.—Historical management areas and index survey sites for spot shrimp in Prince William Sound.



Figure 5.—Shrimp trawl fishing sections in Prince William Sound.

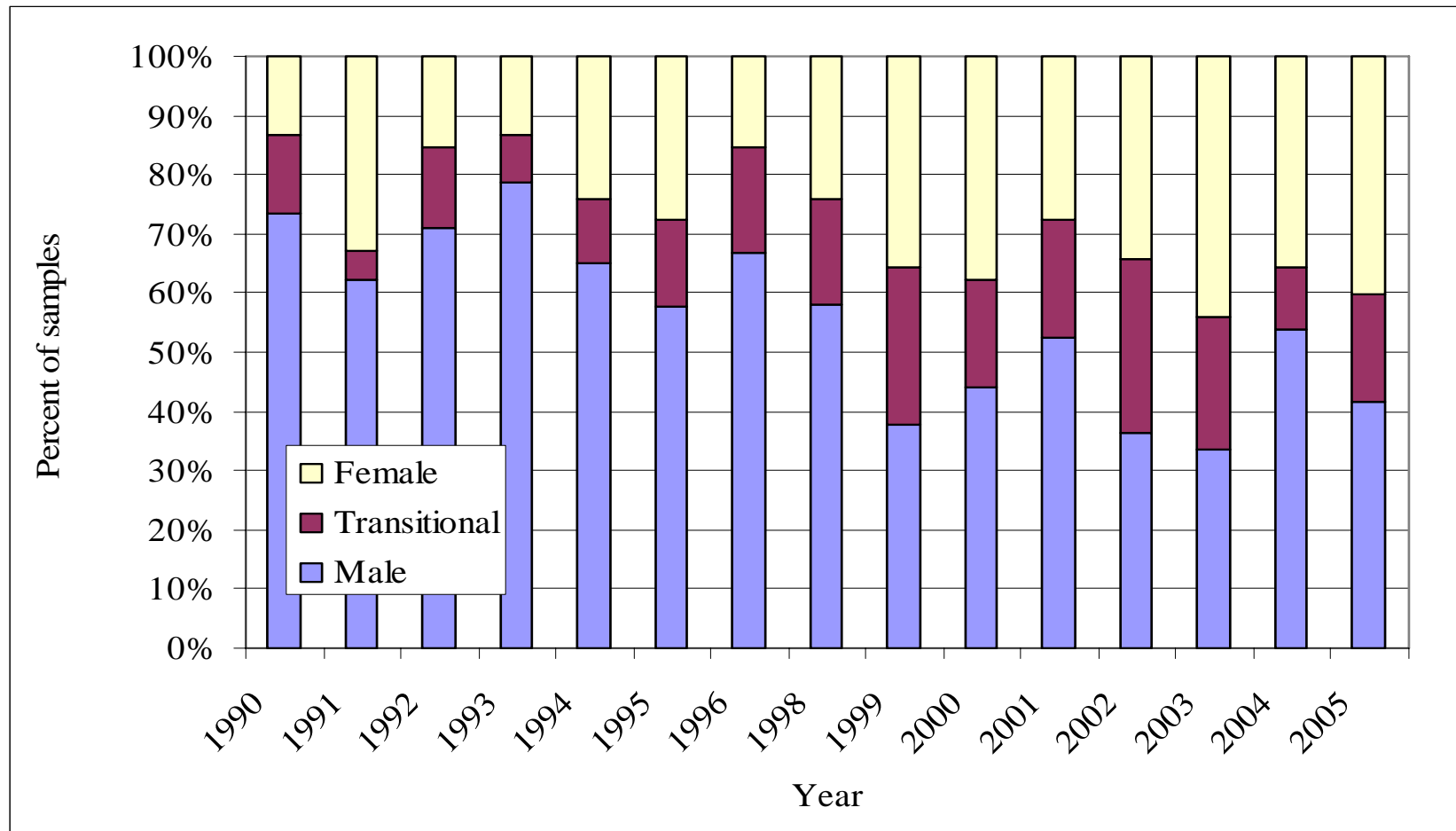


Figure 6.—Sex composition of mature sidestripe shrimp sampled from commercial trawl harvests in Prince William Sound, 1990–2005.

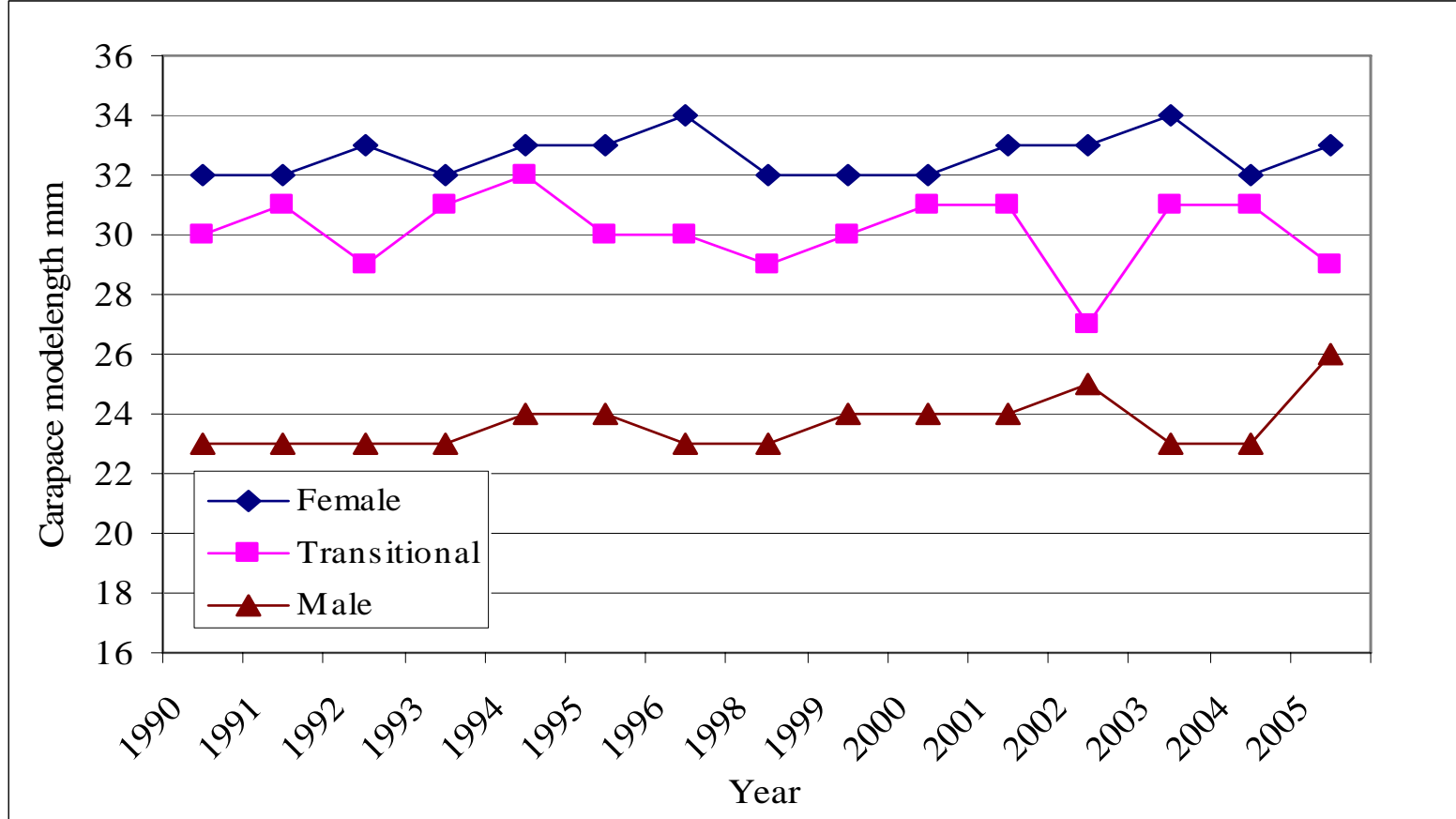


Figure 7.—Predominate carapace mode length of sidestripe shrimp sampled from commercial trawl harvests in Port Wells and Wells Passage, 1990–1996 and 1998–2005.

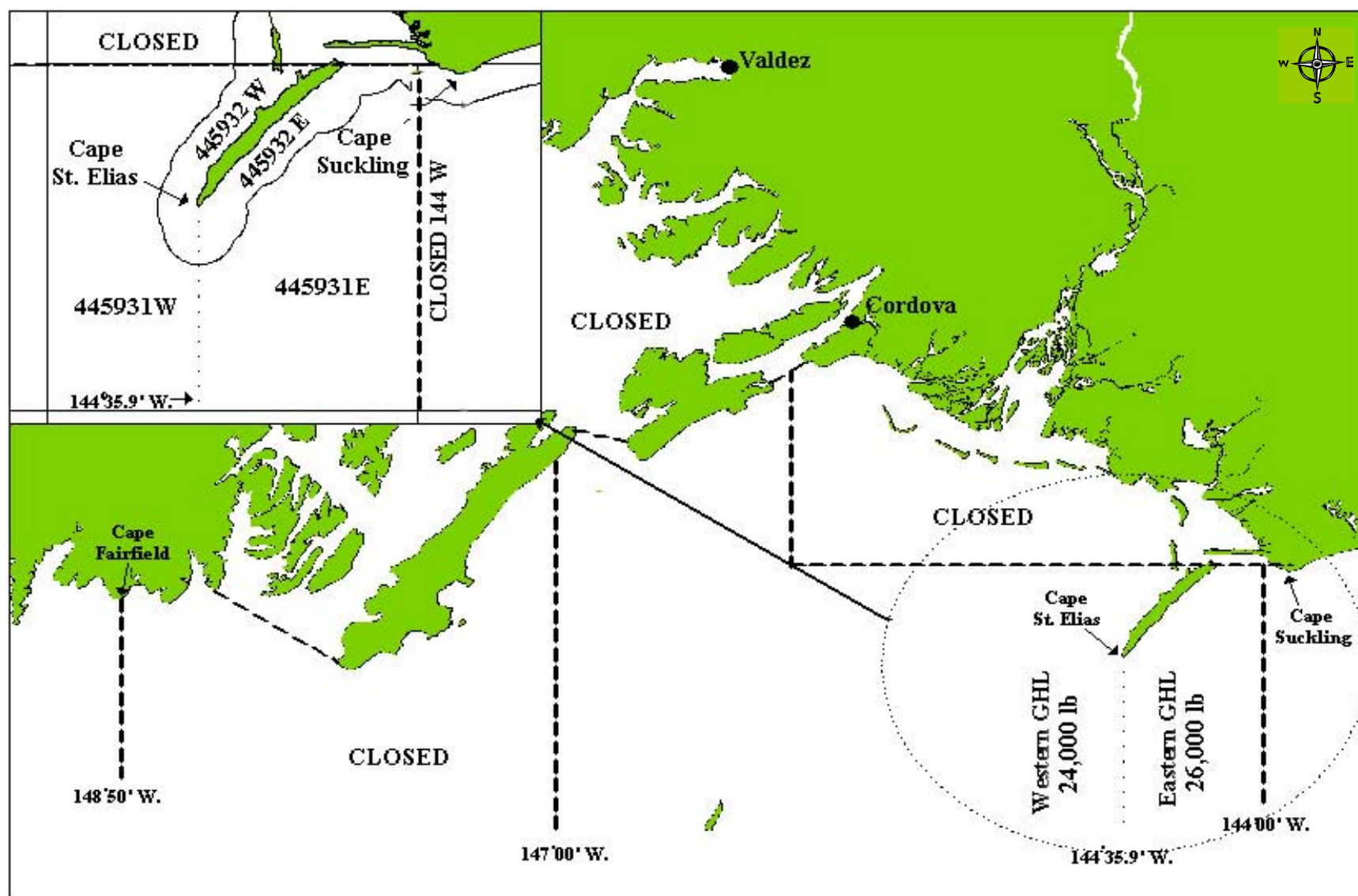


Figure 8.—Fishing areas, including statistical area designations, and 2005 GHIL for weathervane scallops in Prince William Sound.

APPENDIX A

Appendix A1.—Commercial Dungeness crab harvests and effort in Prince William Sound, 1960–2005.

Year	Outside District					Inside District					Total Harvest (lb)
	Landings	Vessels	Harvest (lb)	Number of Crab	Percent Recruits	Orca Inlet		Other Areas			
						Vessels	Harvest (lb)	Landings	Vessels	Harvest (lb)	
1960							1,524,326				1,524,326
1961							990,242				990,242
1962							1,353,190				1,353,190
1963							1,216,846				1,216,846
1964							1,290,929				1,290,929
1965							1,240,372				1,240,372
1966							999,341				999,341
1967							N/A				N/A
1968							579,279				579,279
1969			336,696				541,822				878,518
1970			78,223				660,411				738,634
1971			78,848				430,976				509,824
1972			437,865				286,808				724,673
1973			458,613				347,764				806,377
1974			290,149				269,015				559,164
1975			654,410				163,631				818,041
1976		4	254,933			3	35,399				290,332
1977		4	506,751			23	228,858				735,609
1978		12	1,319,451			34	648,439		17	49,571	2,053,461
1979		19	504,770			32	123,245		16	20,924	652,924
1980		10	659,667				CLOSED		5	31,152	690,819
1981	202	18	1,503,574		25%		“ “	11	5	5,683	1,509,257
1982	139	16	757,911	332,417	26%		“ “	4	2	4,221	762,182
1983	86	9	379,094	184,026	49%		“ “	14	2	511	379,605
1984	88	10	826,778	413,394	92%		“ “	2	2	150	826,938
1985	124	17	1,006,196	483,748	63%		“ “	5	1	^a	1,007,429

-continued-

Appendix A1.—Page 2 of 2.

Year	Outside District					Inside District					Total Harvest (lb)
	Landings	Vessels	Harvest (lb)	Number of Crab	Percent Recruits	Orca Inlet		Other Areas			
						Vessels	Harvest (lb)	Landings	Vessels	Harvest (lb)	
1986	105	16	1,090,477	531,940	58%		CLOSED			0	1,090,477
1987	92	13	887,713	438,974	34%		“ “	2	2	^a	893,174
1988	48	8	602,969	298,569	52%		“ “			0	602,969
1989	43	9	635,976	326,226	25%		“ “			0	635,976
1990	63	17	397,913	196,266	36%		“ “			0	397,913
1991	32	14	70,259	39,033	62%		“ “			0	70,259
1992	5	2	^a	^a			“ “			0	^a
1993-Present	FISHERY CLOSED										

Note: Missing data implies no harvest occurred or no data were collected if a harvest did occur.

^a Confidential data.

Appendix A2.—Catch and effort in the commercial shrimp pot fishery of Prince William Sound, 1960–2005.

Year	Vessels	Landings	Weight (lb) ^a			Total
			Spot	Coonstripe	Other	
1960						4,988
1961						-
1962						3,576
1963						1,101
1964						4,248
1965						4,356
1966						-
1967						749
1968						6,866
1969						5,146
1970						19,776
1971						13,073
1972						6,949
1973						6,370
1974						24,978
1975						4,150
1976						2,410
1977						7,516
1978	9	17	No Data	No Data	No Data	15,466
1979	17	98	No Data	No Data	No Data	52,208
1980	23	155	84,787	5,174	67	90,028
1981	51	509	153,017	20,055	465	173,537
1982	57	397	205,746	7,250	784	213,781
1983	71	646	198,719	14,119	583	213,420
1984	79	513	198,729	7,911	640	207,280
1985	78	528	271,928	3,919	860	276,707
1986	80	540	286,105	3,715	812	290,632
1987	86	498	265,707	3,795	151	269,653
1988	76	433	191,630	764	48	192,442
1989	33	69	28,884	431	0	29,315
1990	23	59	36,378	358	0	36,737
1991	15	45	17,302	278	0	17,580
1992-Present			Fishery Closed			

^a Catches converted from tail weight to whole weight using a conversion factor of 2.0.

Appendix A3.—Prince William Sound shrimp trawl harvests, 1972–2005.

Year	Vessels	Landings	Whole Weight (lb) ^a				Total Pounds
			Northern	Sidestripe	Other	Deadloss	
1972	N/A	N/A	N/A	N/A	N/A	N/A	5,153
1973	"	"	"	"	"	"	4,243
1974	"	"	"	"	"	"	1,345
1975	"	"	"	"	"	"	26,961
1976	"	"	"	"	"	"	134,115
1977	"	"	"	"	"	"	170,757
1978	8	"	"	"	"	"	440,684
1979	4	"	"	"	"	"	634,518
1980	6	"	"	"	"	"	557,328
1981	4	"	"	"	"	"	70,560
1982	9	"	"	"	"	"	346,517
1983	13	46	420,275	1,058	2,345	"	423,678
1984	14	55	1,292,643	8,842	1,155	"	1,302,640
1985	6	44	432,514	15,696	440	"	448,650
1986	3	44	218,156	27,701	13	"	245,870
1987	2	109	^b	^b	^b	"	^b
1988	4	99	497	111,898	52	"	112,447
1989	1		^b	^b	^b	^b	^b
1990	4	89	3,348	105,795	15	18,303	127,461
1991	5	67	3,453	84,483	193	51,429	139,558
1992	5	70	651	196,467	28	49,097	246,243
1993	7	72	23	190,976	51	55,140	246,190
1994	6	47	749	85,980	0	24,134	110,863
1995	4	39	0	73,706	0	24,189	97,895
1996	3	42	0	89,551	0	21,704	111,255
1997	3	63	0	70,026	0	22,060	92,086
1998	2	39	^b	^b	^b	^b	^b
1999	3	47	0	56,386	0	7,754	64,140
2000	3	46	0	61,566	0	12,377	73,943
2001	3	45	0	59,736	0	21,765	81,501
2002	3	43	0	54,736	0	14,532	69,268
2003	3	46	612	61,269	106	18,236	80,223
2004	3	44	1,371	54,437	423	29,002	85,238
2005	3	41	0	61,130	413	23,028	84,571

^a Catches converted from tail weight to whole weight using a conversion factor of 1.67.

^b Confidential data due to the small number of participants.

Appendix A4.—Commercial razor clam harvests in Prince William Sound, 1960–2005.

Year	Commercial		Non Commercial	
	Diggers	Pounds	Diggers	Pounds
1960		433,930		
1961		261,628		
1962		208,698		
1963		86,340		
1964		39,275		
1965		86,477		
1966		27,063		
1967		98,446		
1968		72,806		
1969		26,887		
1970		27,909		
1971		37,972		
1972		30,326		
1973		30,318		
1974		29,747		
1975		15,443		
1976		1,516		
1977	11	2,160		
1978	54	29,865		
1979	26	12,904		
1980	21	5,881		
1981	7	28,970		
1982	12	15,275		
1983	41	124,835		
1984	41	168,426		
1985	25	60,274	37	4,930
1986	17	13,122	38	4,831
1987	12	40,954	83	6,225
1988	4	6,766	52	2,768
1989	No Effort	0	50	2,903
1990	" "	0	50	2,641
1991	" "	0	77	1,484
1992	" "	0	92	2,403
1993	^a	^a	37	1,131
1994	No Effort	0	28	459
1995	" "	0	14	92
1996	" "	0	19	381
1997	" "	0	10	145
1998	" "	0	4	32
1999	" "	0	5	29
2000	No Effort	0	4	27
2001	No Effort	0	9	86
2002	No Effort	0	7	71
2003	No Effort	0	6	69
2004	No Effort	0	11	74
2005	NoEffort	0	17	130

^a Confidential data due to the small number of participants.

Appendix A5.—Commercial harvests of weathervane scallops from Prince William Sound, 1992–2005.

Year^c	No. of Vessels	Harvest^a (meat lb)	GHL^b (meat lb)	Season (hours)	Comments
1992	4	208,836	64,000		
1993	7	63,068	50,000	67	
1994	Fishery rescheduled to 1995				Season start date changed.
1995	2	^a	50,000	390	Additional 60,000 lb of illegal harvest.
1996	0		0		Closed due to illegal harvest.
1997	1	^a	17,200	141	
1998	2	19,650 combined	6,000 East 14,000 West	78	
1999	2	20,275 combined	6,000 East 14,000 West	54 East 84 West	
2000	3	30,266 combined	9,000 East 21,000 West	744 East 783 West	
2001	1	^a	9,000 East 21,000 West	5,367 East 5,441 West	
2002	2	15,641 combined	6,000 East 14,000 West	5,544 East 5,517 West	
2003	1	^a	6,000 East 14,000 West	5,004 East 4,984 West	
2004	2	49,290 combined	26,000 East 24,000 West	2,748 East 5,367 West	
2005	3	49,205 combined	26,000 East 24,000 West	1,264 East 1,048 West	

^a Confidential data due to the low number of participants.

^b Separate GHLs were established for areas east and west of Kayak Island beginning in 1998.

^c Harvest total for east and west areas combined are provided by provisions of confidentiality releases.